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INTERLOCKING OF MODULAR BUILDING COMPONENTS

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(57) Claim

The adoption of metal framework has to a large extent, opened up the use of modular panels which can incorporate conventional stud framework and can be bolted, screwed, crimped or otherwise fitted together in a more efficient and cost effective manner than the previous labour intensive process of building a framework and then lining it on both sides. However, a problem with such modular panels is the current usage of a visible sealing and/or a locking element between adjacent panels. Such an element, which is commonly referred to as a joint strip, has a facing which overlaps the external edges of adjacent cladding panels and limits the scope of decoration on the exterior face of the constructed wall, since not only is it visible, but it usually extends outwardly from the plane of the wall, generally from floor to ceiling, and cannot be readily concealed.

It is therefore an object of the present invention to provide a system for interconnecting modular building

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panels and/or studs which does not rely on the use of such visible joint strips.

1. A building stud of substantially channel profile having a longitudinal recess formed therein which extends from one end of the stud to the other, said recess being adapted to receive a keying element for connection to an adjacent similarly recessed stud whereby the keying element is frictionally engaged within the recess of each stud to act as a positive locator during erection of the studs, as well as a seal between the studs.

15. A keying element comprising a longitudinally extending resiliently deformable member which is adapted to frictionally engage in a longitudinal recess of a metal building stud as defined in any one of claims 1-10.

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COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

INTERLOCKING OF MODULAR BUILDING COMPONENTS

The following statement is a full description of the invention including the best method of performing it known to us:

THIS INVENTION relates to the construction of buildings and is primarily concerned with a building system comprising modular building panels and/or profiled studs which can be readily erected with sealing elements therebetween. The system is particularly amenable to building panels used in the construction of low rise structures such as residential dwellings, shops and the like, and it will be described in that context. It will, nevertheless, be readily appreciated by the skilled addressee that the system has much broader ramifications than this.

As timber resources become more scarce and costly, the use of substitute building components has become more prevalent. Buildings constructed with complete metal frameworks are now commonplace and are assuming an ever increasing market share. The adoption of metal framework has to a large extent, opened up the use of modular panels which can incorporate conventional stud framework and can be bolted, screwed, crimped or otherwise fitted together in a more efficient and cost effective manner than the previous labour intensive process of building a framework and then lining it on both sides. However, a problem with such modular panels is the current usage of a visible sealing and/or a locking element between adjacent panels. Such an element, which is commonly referred to as a joint strip, has a facing which overlaps the external edges of adjacent cladding panels and limits the scope of decoration on the

exterior face of the constructed wall, since not only is it visible, but it usually extends outwardly from the plane of the wall, generally from floor to ceiling, and cannot be readily concealed.

5 It is therefore an object of the present invention to provide a system for interconnecting modular building panels and/or studs which does not rely on the use of such visible joint strips.

10 According to one aspect of the present invention, there is provided a building stud of substantially channel profile having a longitudinal recess formed therein which extends from one end of the stud to the other, said recess being adapted to receive a keying element for connection to an adjacent similarly recessed stud whereby the keying element is frictionally engaged within the recess of each stud to act as a positive locator during erection of the studs, as well as a seal between the studs.

20 The term "building stud" is intended to indicate a stud with which a cladding panel can be integrally formed as a separate building unit, as well as a stud to which a cladding panel can be connected to form an integral structure.

25 The term "positive locator" is intended to mean something which aids in the correct alignment of adjacent studs with respect to one another.

 The stud will generally be fabricated from sheet

metal such as galvanized iron or steel which is roll formed to the required profile. It is, however, also possible to fabricate the stud from high density plastics materials, particularly thermoplastics materials, by common extrusion processes.

Generally, only one or two longitudinal recesses will be formed in the building stud which are preferably offset towards opposite side edges thereof. However, three or, indeed, a multiplicity of recesses could be formed if deemed necessary for any particular application, for instance in buildings erected in cyclone prone areas. When there are two recesses, that is, the most preferred number, these will preferably be located symmetrically with respect to the longitudinal stud axis.

The recess or recesses preferably have a substantially rectangular cross-sectional configuration as such a shape is particularly suitable for inserting a complementary shaped rectangular profile keying element. However other configurations such as semi-circular, polygonal, star-shape or the like, may be quite suitable in some circumstances. The prime requirements are for the keying element to be readily locatable and to provide the necessary sealing action when in place.

The preferred profile for the keying element is either rectangular, T-shaped or substantially circular. The keying element can, furthermore, be ribbed and/or include one

or more cavities to permit additional deformation and provide a better sealing action if deemed necessary in any particular application.

Suitable materials from which the resiliently deformable keying element may be fabricated are rubbers such as polyisoprene and butyl rubber, and plastics materials such as polyurethane, polyvinylchloride, polyethylene and the like.

The specific profile of the building stud will generally be determined by the type of wall being constructed and whether it is a separate integer or is integrally formed as part of a panel construction. In the latter instance, for example, it may comprise two substantially parallel side flanges separated by a web, with the recess or recesses being formed in the web. Preferably, an intermediate portion of the web itself is also slightly set back between the two side flanges and this section may accommodate a portion of the keying element. In such an arrangement, a T-shaped keying element may be utilized, with the leg of the "T" extending into this "set-back" and the two arms of the T extending into the respective recesses of adjacent panel studs. Similarly, an H-shaped keying element could be utilized where there are two pairs of recesses and a "set-back" between them.

When it is desired to erect two panels at right angles to one another, the longitudinal recess can be formed in a side flange of one of the building studs for connecting

with a keying element to the aforementioned recess in the web of an adjacent building stud. However, it is more usual to use a corner bracket in such a construction. Such a bracket is designed to fit into the panel stud profile and may be attached by screws or similar fixtures. A suitable bracket for this purpose is the subject of our co-pending Design Registration No. 107,292.

Openings may be incorporated in the webs of the building studs to permit connectors and service components to pass therethrough. The connectors may be bolts or tongues pressed from structural componentry which are part of the framework structure, for instance intermediate panel rails, bottom panel rails and top panel rails.

Another aspect of the present invention relates to the keying element per se. That is, the invention also provides a keying element comprising a longitudinally extending resiliently deformable member which is adapted to edgewise frictionally engage in the recess of the aforementioned building stud.

The erection of panels or studs incorporating the longitudinal recess or recesses is a simple matter. In the case of panels incorporating integral studs, the panels are brought into parallel abutting alignment with one another, with the studs in face-to-face contact. This may be achieved, for instance, by placing the panels sequentially over a bottom panel rail and edging one panel against the

other which has previously been fixed in position. The keying element or elements is(are) then inserted into the recess or recesses by working them in from the top end of the studs. Alternatively, the keying element or elements can be frictionally engaged within one of the building studs prior to aligning the adjacent building stud therewith and edging the adjacent stud onto the keying element or elements. In fact, this latter process is preferred as the keying element provides a positive locator during construction and assists in the alignment of the panels. The panels may then be bolted or screwed together through holes provided along the web or building studs, and topped with a cap which also extends over the top panel rail.

Preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a two panel framework erected by an interlocking system according to the present invention;

Figure 2 is an exploded enlarged perspective view of a bottom section of the panels of Figure 1;

Figure 3 is an enlarged perspective view of a mid-section region of one of the panels of Figure 1;

Figure 4 is an exploded enlarged perspective view of a top section of the panels of Figure 1; and

Figure 5 is an enlarged perspective view of a mid-

sectional region of one of the panels of Figure 1 showing an alternative keying element.

In all the drawings, like reference numerals refer to like parts.

5 The drawings depict a panel framework fabricated from pressed galvanized sheet steel which is particularly suitable for the construction of residential buildings.

Referring firstly to Figure 1, each panel framework comprises two building studs 10, a bottom rail 11, a top rail 12, and an intermediary rail 14. These studs and rails are all formed with the same profile and are initially press-fitted together and connected by tabs passing from the rails to slots in the studs in the manner hereinafter described.

10 A top cap 13 snugly fits over the top rails of adjacent panel frameworks to provide a covering and a surface on which roofing or other framing componentry may be erected. Each building stud 10 has a substantially U-shaped configuration with two longitudinal recesses 20, 21 (see 15 Figures 2-5) formed in a web portion 22 thereof. An intermediate section of the web portion is itself set back from the edge 23 of the building stud between the two side flanges.

20 The recesses 20, 21 are substantially rectangular in cross-sectional profile and are dimensioned so as to 25 snugly accommodate keying elements 24, 25. The keying elements are resiliently deformable T-section polyethylene

strips which extend from the bottom rail 11 to the top rail 12 (see Figures 2 and 4).

The intermediate rail 14, is connected to the building studs 10 by means of tab connectors 30 (see Figure 3) which are metal web extensions formed on the ends of the rail webs. These tab connectors pass through aligned slotted openings 31 in the webs 22 of the stud and are bent over when in place. Similar tab connectors 32, 33 connect the building studs to the bottom rail 11 (see Figure 2) and the top rail 12 (see Figure 4).

The panel construction system depicted in the drawings also includes a floor flashing 40 (see Figure 2), a panel track 41 on which the panels are aligned, and aligned openings 42, 43 for connector elements (not depicted) and services such as electricity cables and water pipes.

Figure 5 depicts a portion of a similar building system to that shown in Figures 1-4 but wherein the keying elements 24a, 25a are plastic piping having a substantially circular profile and longitudinal ribbing on the exterior thereof. The plastic piping has a honeycomb type construction when viewed in cross-section, with longitudinal channels to permit deformation when the keying elements are compressed into the recesses 20, 21 of the studs.

The particular assembly depicted in the drawings may be constructed by initially laying down the panel track 41 on a suitable load bearing surface where the panel is to

be erected; optionally inserting a flashing 40 (i.e., depending on whether one of the sides constitutes an external wall); placing and fixing the first panel A over the panel track and inserting the keying elements 24, 25 in the stud
5 recesses; placing the second panel B over the panel track and edging it towards the first panel A while simultaneously aligning and locating the recesses 20, 21 with respect to the keying elements; and abutting the second panel B tightly against the first panel A. The second panel may then be
10 locked in position by screws 44 passing into the panel track 41 and by bolts or the like passing through the stud openings 42. The construction is completed by locking the top cap 13 to each panel by screws 45 which pass through the top cap into the top rail 12.

15 It can be seen from the above that the jointing system acts as a positive locator during construction and doubles as an effective weather seal. The keying element is, furthermore, such that it does not protrude from the gap between the panels and therefore does not limit the scope of
20 external decoration.

25 Whilst the above has been given by way of illustrative example of the invention, many modifications and variations may be made thereto by persons skilled in the art without departing from the broad scope and ambit of the invention as herein set forth in the following claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A building stud of substantially channel profile having a longitudinal recess formed therein which extends from one end of the stud to the other, said recess being adapted to receive a keying element for connection to an adjacent similarly recessed stud whereby the keying element is frictionally engaged within the recess of each stud to act as a positive locator during erection of the studs, as well as a seal between the studs.
2. A building stud as claimed in claim 1 which comprises two substantially parallel side flanges separated by a web.
3. A building stud as claimed in claim 2 in which the longitudinal recess is formed in the web.
4. A building stud as claimed in claim 3 wherein the longitudinal recess is open on the side of the web which faces away from the stud.
5. A building stud as claimed in any one of claims 2-4, wherein the web extends at right angles to each of the side flanges.
6. A building stud as claimed in any one of claims 2-5 in which an intermediate section of the web is set back between the two side flanges.
7. A building stud as claimed in any one of the preceding claims in which the recess has a substantially rectangular cross-sectional configuration.

8. A building stud as claimed in any one of the preceding claims and which includes two longitudinal recesses formed therein, which recesses are parallel to one another.

9. A building stud as claimed in claim 8 in which the longitudinal recesses are located symmetrically with respect to the longitudinal stud axis.

10. A building stud as claimed in any one of the preceding claims and including openings therein to permit connectors and service components to pass therethrough.

11. A building stud as claimed in any one of the preceding claims in combination with a cladding panel, said cladding panel being integrally formed with said stud.

12. A building stud as claimed in any one of the preceding claims in combination with a keying element which is frictionally engaged within each said longitudinal recess.

13. A building stud as claimed in claim 12 in which the keying element is a longitudinal extending resiliently deformable member.

14. A building element as claimed in claim 12 or claim 13 wherein the keying element is rectangular, T-shaped or substantially circular, in profile.

15. A keying element comprising a longitudinally extending resiliently deformable member which is adapted to frictionally engage in a longitudinal recess of a metal building stud as defined in any one of claims 1-10.

16. A keying element as claimed in claim 15 which is

fabricated from a rubber or plastics material.

17. A keying element as claimed in claim 16 which is fabricated from polyvinylchloride.

18. A keying element as claimed in any one of claims 15-17 which is rectangular, T-shaped or substantially circular in profile.

19. A metal building stud substantially as herein described with reference to the accompanying drawings.

20. A keying element substantially as herein described with reference to the accompanying drawings.

DATED this 17th day of September 1990

LOGAN UNITS (AUSTRALIA) PTY. LTD.

By their Patent Attorneys

CULLEN & CO.

Fig.1.

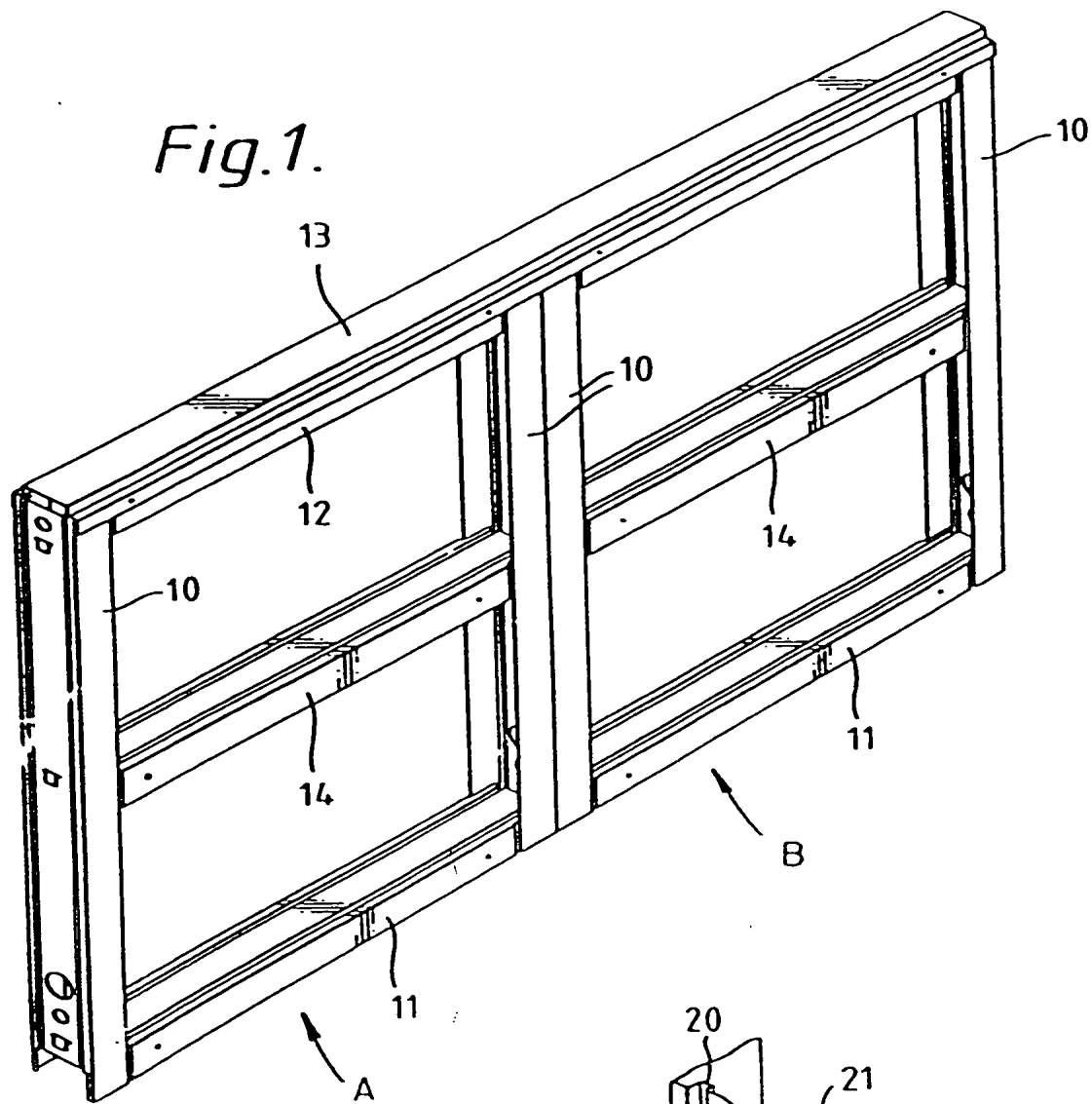


Fig.3.

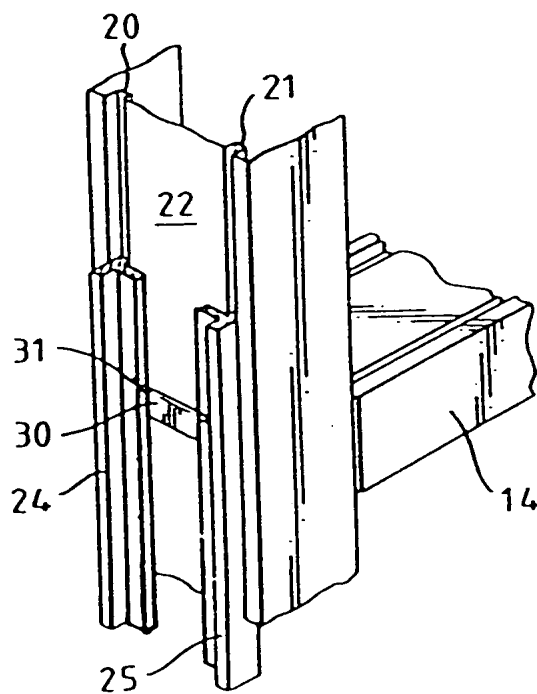


Fig.2.

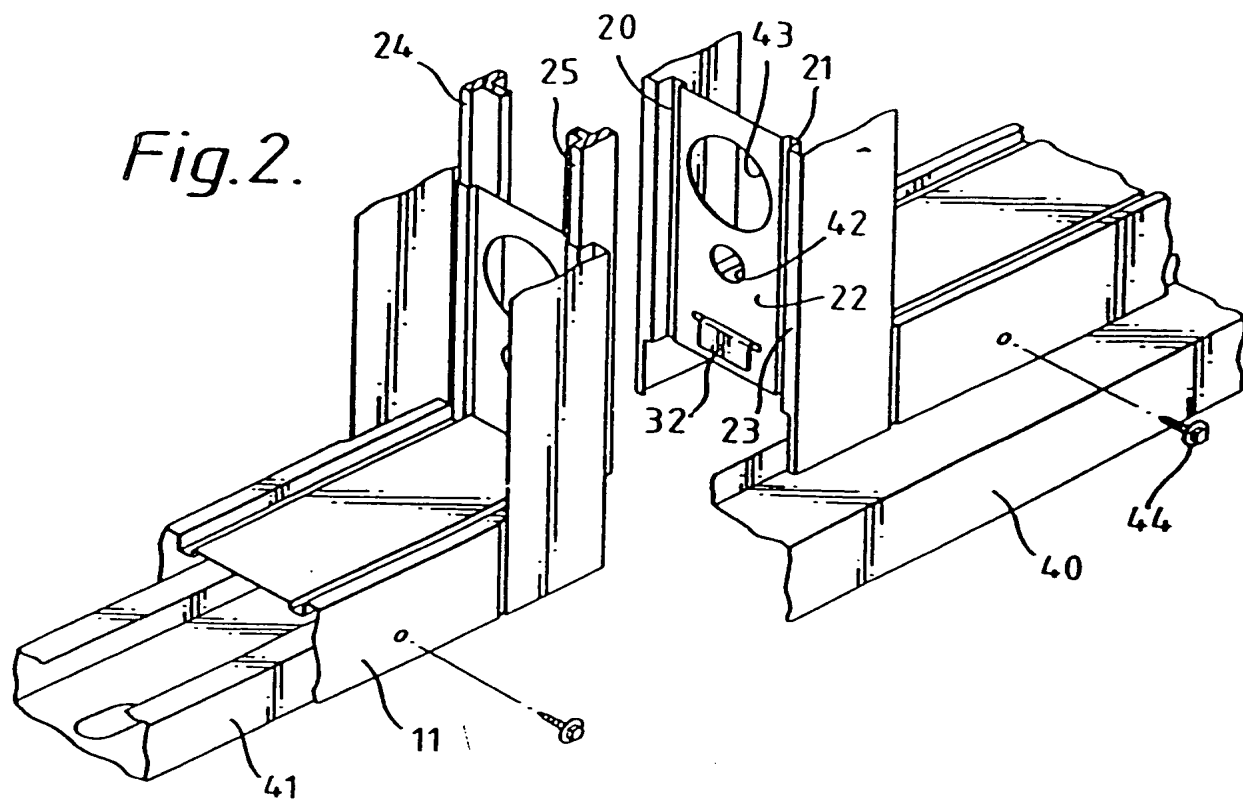
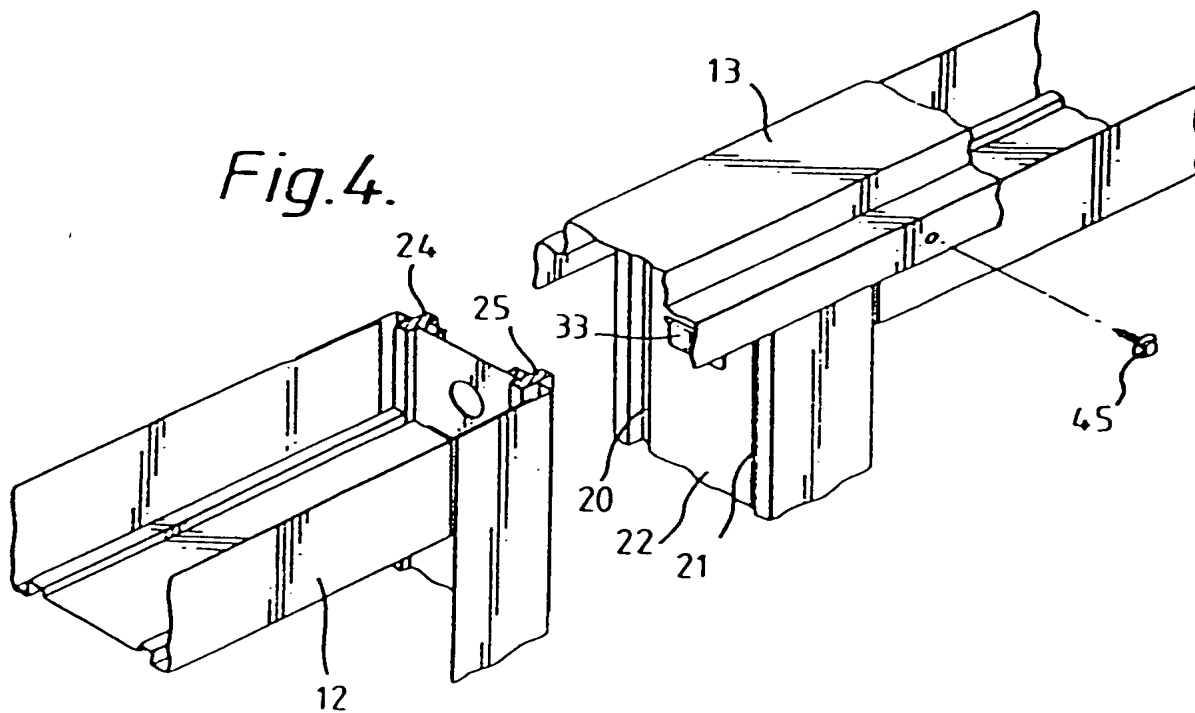


Fig.4.



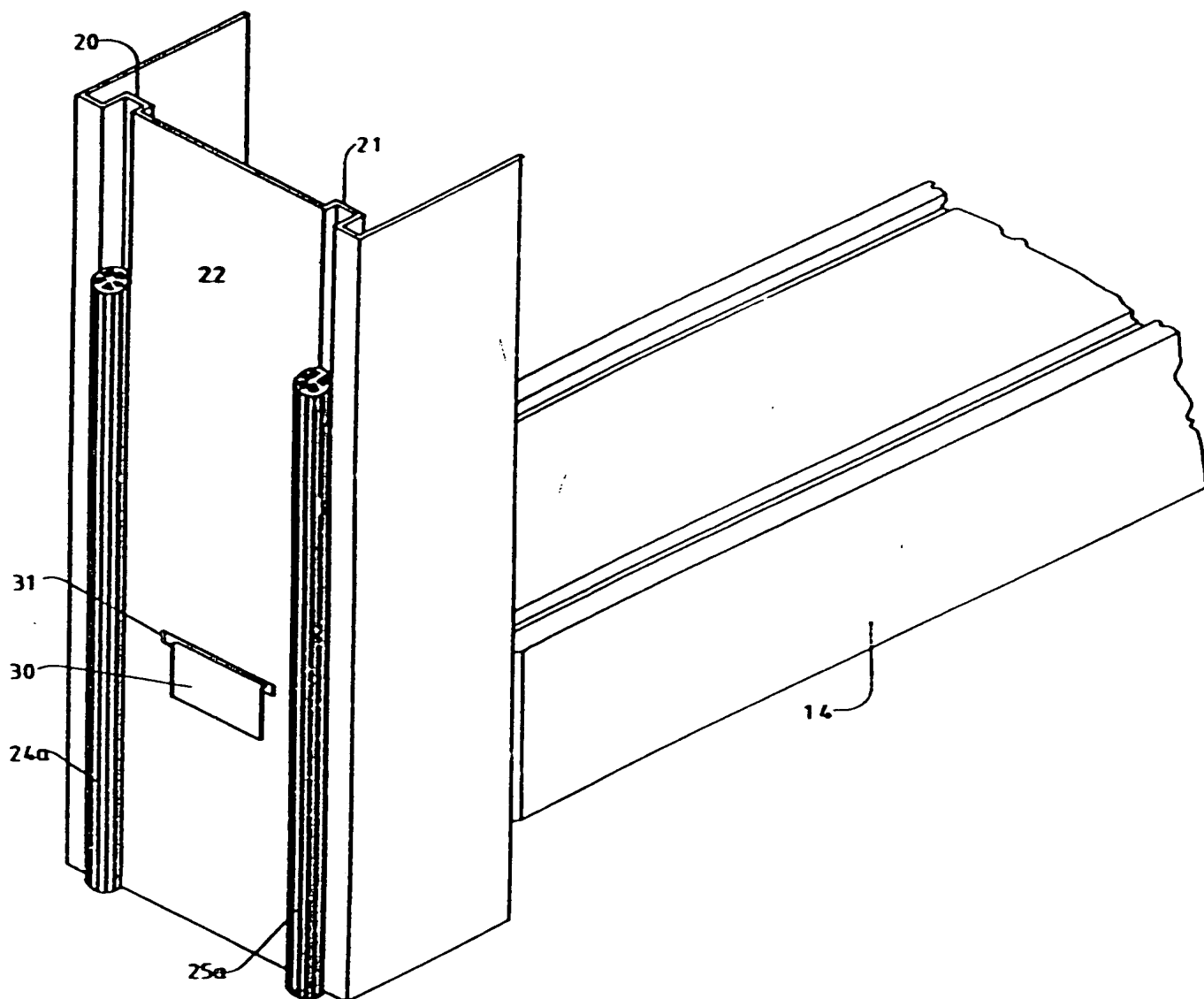


FIG. 5

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